

REMARKS/ARGUMENTS

Applicant thanks Examiner for the detailed Office Action dated March 6, 2006. In response to the issues raised, the Applicant offers the following submissions. Furthermore, we enclose a Terminal Disclaimer linking the term and ownership of any patent granted on the present application to that of co-pending USSN 10/773,193.

Amendments

The Abstract has been amended to remove ‘claim-like’ language such as ‘comprising’.

Abstract

As discussed above, we believe that the amended Abstract provides a clear and concise description of the disclosure in compliance with 37 CFR 1.72.

Double Patenting

Claims 1-18, 21-22 and 38-54 stand provisionally rejected as not patentably distinct from claims 1-19 and 38-54 of co-pending USSN 10/773,193. While the Applicant disagrees that any claims of the present application are an obvious derivation of ‘193, we enclose a Terminal Disclaimer to ‘193 in the interests of expeditious prosecution.

Claims 19, 20, 23 – 37 stand provisionally rejected for statutory double patenting for claiming the same invention as co-pending USSN 10/773,193. Amendments to the claims of ‘193 have distinguished it’s invention from that of the present application.

Claims – 35USC§103

Claims 1, 2, 6, 11, 18-20, 23, 25, 30 and 37 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani. The Applicant disagrees.

The invention has developed suspended heater elements that are deposited in a geometric configuration that allows them to deform due to thermal expansion without bending about

its thinnest cross sectional dimension. That is, the heater element does not need to bow or bend out of its plane of deposition in order to relieve the strain of thermal expansion. Ordinary workers in this field will recognize that this is particularly difficult with suspended heater elements. As the heater elements are not supported by any underlying substrate, their natural tendency is to bend about it's thinnest cross sectional dimension; typically its thickness of deposition.

A suspended heater element provides substantial benefits in terms of thermally isolating the elements from the underlying substrate and thereby avoiding the need to actively cooling the printhead. However, bowing out of the plane of deposition can significantly alter the drop ejection characteristics of a nozzle as the position of the generated bubble changes relative to the nozzle aperture.

None of the cited references recognize this problem. Kubby does not mention heater deformation from thermal expansion and Mitani is not concerned with deformation, but rather heater element cracking because it's supporting substrate has a high coefficient of thermal expansion (CTE). The solution offered by Mitani is to support the heater element on a substrate with a very low CTE so that the heater element remains in compression and thereby avoids crack initiation and propagation. Coating a suspended heater element with a low CTE material reduced the thermal efficiency gained by suspending the heater, and reduces the amount of thermal expansion, but does not prevent the heater from bowing out of its plane of deposition to relieve thermal expansion. Accordingly, the ordinary worker would not expect the combination of Kubby, Ims and Mitani to provide a heater element configured such that the thermal expansion can be relieved without bending about its thinnest cross sectional dimension (and therefore out of the plane of deposition).

It is well established that a *prima facie* case of obviousness requires the cited references to:

- 1) provide some suggestion or motivation to combine the teaching of each reference to yield the invention;
- 2) have a reasonable expectation of successfully combining the references to yield the invention; and,
- 3) disclose all the claim elements.

It is respectfully submitted that the citations fail to meet these basic criteria. Accordingly, independent claims 1 and 19 are not anticipated by the cited references and it follows that dependent claims 2, 6, 11, 18, 20, 23, 25, 30 and 37 are likewise non-obvious.

Claims 5 and 24 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 4,982,199 to Dunn. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Dunn. Accordingly, claims 5 and 24 are not obvious in light of Kubby, Ims, Mitani and Dunn.

Claims 10 and 29 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 6,543,879 to Feinn et al. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Feinn. Accordingly, claims 10 and 29 are not obvious in light of Kubby, Ims, Mitani and Feinn.

Claims 3, 8, 13, 21, 27 and 32 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 5,841,452 to Silverbrook. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in '452 Silverbrook. Accordingly, claims 3, 8, 13, 21, 27 and 32 are not obvious in light of Kubby, Ims, Mitani and '452 Silverbrook.

Claims 12 and 31 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 5,831,648 to Mitani et al. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in '648 Mitani. Accordingly, claims 12 and 31 are not obvious in light of Kubby, Ims, '475 Mitani and '648 Mitani.

Claims 14 and 33 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US

5,534,898 to Kashino et al. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Kashino. Accordingly, claims 14 and 33 are not obvious in light of Kubby, Ims, Mitani and Kashino.

Claims 15 and 34 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 4,965,594 to Komuro. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Komuro. Accordingly, claims 15 and 34 are not obvious in light of Kubby, Ims, Mitani and Komuro.

Claims 7, 16, 26 and 35 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 5,710,070 to Chan. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Chan. Accordingly, claims 7, 16, 26 and 35 are not obvious in light of Kubby, Ims, Mitani and Chan.

Claims 17 and 36 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 4,931,813 to Pan et al. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in Pan. Accordingly, claims 17 and 36 are not obvious in light of Kubby, Ims, Mitani and Pan.

Claims 9 and 28 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 5,856,836 to Silverbrook. As discussed above, Kubby, Ims and Mitani fail to render independent claims 1 and 19 obvious, and the deficiencies of these citations are not remedied by the disclosure in '836 Silverbrook. Accordingly, claims 9 and 28 are not obvious in light of Kubby, Ims, Mitani and '836 Silverbrook.

Claims 38, 39, 43, 47 and 54 stand rejected as obvious in light of US 5,706,041 to Kubby, in view of US 4,797,692 to Ims, in further view of US 5,444,475 to Mitani, in still further view of US 4,549,191 to Fukuchi et al. The Applicant disagrees.

As discussed above, Kubby, Ims and Mitani do not motivate the ordinary worker to configure a suspended heater element so that it can relieve thermal expansion in a way other than bending about its thinnest cross sectional dimension. Fukuchi also fails disclose a method for fabricating a heater element with these abilities. Accordingly, independent claim 38 is patentably distinguished from the citations. Likewise, dependent claims 39, 43, 47 and 54 are also non-obvious.

Dependent claims 40, 42, 44, 45, 46, 48, 49, 50, 51 and 52 also stand rejected as obvious. However, the additional references cited by the Examiner are discussed above in relation to their failure to teach a heater element configured so that thermal expansion can be accommodated without bending about the thinnest cross sectional dimension. Accordingly, the additional references fail to address the deficiencies of Kubby, Ims, Mitani and Fukuchi in relation to independent claim 38, and therefore these claims are also not anticipated by the cited art.

Conclusion

It is respectfully submitted that the Examiner's rejections have been successfully traversed and the application is now in condition for allowance. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

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